Experimental work in sheep and other animal models has successfully achieved long-term multilineage allogeneic or xenogeneic hematopoietic chimerism in immunopermissive fetuses without the requirement for myeloablation or immunosuppression. This chimerism in immuno permissive fetuses has been shown to be secondary to the engraftment of true pluripotent hematopoietic stem cells. Limited clinical success has been achieved in immunodeficiency disorders in which there is a selective advantage for donor cells. However in most diseases this selective advantage does not exist and engraftment has been absent or low. Limited or lack of engraftment, both in terms of cell numbers and in terms of differentiated cell types, currently represents an obstacle to expanded clinical application of in utero stem cell transplantation. The requirement for transplantation during the brief period of immunopermissiveness is another obstacle of the establishment of a successful therapy.

bone marrow transplant

Mesenchymal stem cells are the formative pluripotential cells found *inter alia* in bone marrow, blood, dermis and periosteum that are capable of differentiation into any of the mesenchymal or connective tissues, for example, bone, cartilage, muscle, stroma, tendon, and fat.

This homogeneous population of cells can be passaged in culture and may be characterized by the lack of hematopoietic cell markers and by the presence of a unique set of surface antigens. Under specific conditions they have been induced to form bone, cartilage, adipose tissue, tendon, and muscle, and in their undifferentiated state, resemble roughly stromal fibroblasts and can support hematopoiesis as evidenced by the support of LT-CIC in long term bone marrow culture. Preliminary in vivo studies suggest that these cells home to bone marrow of post-natal recipients after intravenous administration and can accelerate constitution after myeloablative conditioning regimes.

Therefore it is an object of the invention to increase donor cell engraftment in fetal recipients. Another object is to regenerate damaged or diseased tissue by providing to a fetal recipient donor cells which can differentiate in situ. Yet another object is to prepare chimeric organs and tissues. Still another object is to treat a